

***Long Term Changes in Reflectivity and Large Scale Motions in
the Atmosphere of Jupiter and Saturn***

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Strategy

This is an observational investigation that utilizes a CCD camera and multicolor filters with a committed f/40 60 cm telescope to image the temporal changes in Jupiter's and Saturn's atmospheres. The intent of this project is to maintain a continuous data base to assist in relating the Voyager data with that of Galileo and Cassini.

Progress and Accomplishments

Photometrically calibrated observations of large scale changes in the reflectivity of the Equatorial Zone and the South Equatorial Belt (SEB) spanning the 1989 brightening and subsequent darkening of the SEB have been reduced. Analysis of the data by D. Kuehn reveals that the color ratios and limb-darkening behavior can be modelled by increasing the reflectivity and optical thickness of a cloud layer at 0.7 bars and does not require an additional upper cloud layer as had previously been proposed. Analysis of the current apparition is continuing.

Multicolor images of the equatorial storm on Saturn have been map projected and intergated with early transit observations, an image from Pic Du Midi and Hubble Space Telescope (HST) observations. The onset and development of the storm has been mapped and interpreted as a planet encircling wave pattern induced by a single convective disturbance. Efforts to characterize the faint cloud patterns are continuing.

Projected Accomplishments

We will continue to observe Jupiter and Saturn and complete the analysis of the Saturnian storm. This analysis integrates the HST data and previous historical records. During this year the first HST observations of Jupiter will be obtained. The resolution of a preliminary image indicates that, one Jovian year after the Voyager encounters, a second detailed wind profile will be obtained to determine the extent to which the latitudinal variation of the zonal winds vary. We will use this information, combined with our historical database, to characterize temporal variability of the zonal atmosphere. Two papers, one on the Saturn storm by Beebe, et al. and another concerning temporal variability of Jupiter's cloud deck by D. Kuehn and R. Beebe are being revised and will be submitted to *Icarus*.

Publications

Kuehn, D.M., A Study of the Temporal Behavior of the Vertical Structure of Jupiter's Atmosphere, PhD Dissertation New Mexico State University, Dec 1990.